


INTER PLANT STANDARD IN STEEL INDUSTRY		
	SPECIFICATION FOR SET OF V-PACKINGS FOR HYDRAULIC MACHINES	IPSS: 1-02-016-18 (First Revision)
	Corresponding IS does not exist	Formerly: IPSS: 1-02-016-84

0. **FOREWORD**

0.1 Interplant standardisation in steel industry has been initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). This Interplant Standards prepared by the Standard Committee on Basic Standards and Hydraulic, Pneumatic and Lubricating Equipment, IPSS 1 : 2 with the active participation of the representatives of all the steel plants and leading consultants and was first adopted in March 1984. Thereafter standard was again revised in January, 2018.

0.2 Interplant standardization for steel industry primarily aims at achieving rationalization and unification of parts and sub-assemblies used in steel plant equipment and accessories and provides guidance in indenting stores or equipment for existing or new installations by individual steel plants. For exercising effective control on the inventories, it is advisable to select a fewer number of sizes (or type) from among the products mentioned in this standards for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

0.3 The V – Packing are also known as Chevron automatic packing rings or roof shaped packing. These packing are generally used for stopping leakage through reciprocating joints in oil hydraulic machines using petroleum based hydraulic oil as its working medium up to maximum working pressure of 500 kg/ Sq. cm and temperature of 100 deg. C.

1 **SCOPE**

This Inter Plant standard covers the requirement of sets of V-Packing.

- 1.1 The pressure and temperature ranges shall be as follows :
- a. Low pressure up to 100 kg/ Sq. cm. at 70 deg. C.
 - b. Medium pressure up to 300 kg / Sq. cm. at 70 deg. C and
 - c. High pressure over 300 kg / Sq. cm. at 70 deg. C.
- 1.2 For the definition of the terms connected with the rubber industries Part 1 to 4 of IS: 7503-1988“ Glossary of terms used in rubber industry” should be referred to.

Note: Unless otherwise mentioned each set of V-Packings shall consists of one supporting ring, one pressure ring and a number of V-packing rings (depending upon the working pressure) (See Fig. 1).

2 SHAPES AND DIMENSIONS

The shapes of the packing rings shall be as shown in Fig. 1. The actual size required may be ordered specifying the housing bore dimension and the dimensions of shaft or plunger. However, all other requirements shall be in conformity with the standard.

- 2.1 The cross sectional profile of the sealing element shall be designed and dimensioned in such a way those both inner and outer lips shall have same sealing characteristics.

3 MATERIALS

The materials used for the manufacture of V-packing shall be classified into the following two categories:

- a. HSR : Homogeneous synthetic oil resistant rubber (low pressure) and
- b. FSR: Fabric impregnated synthetic oil resistant rubber (medium and high pressure).

Note: Unless stated otherwise both adopter ring and the packing rings shall be made of above mentioned materials. However, as agreed to between the buyer and the supplier, purchaser may indicate other material also.

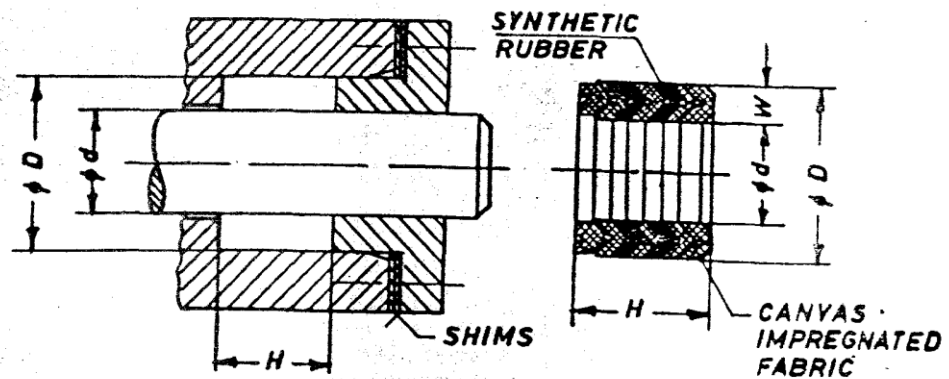


FIG. 1 V-PACKING FOR PISTON ROD AND PLUNGER SEAL
(NOMINAL PRESSURE UP TO 200 KG/CM²)

FIG. 1 : V-PACKING FOR PISTON ROD AND PLUNGER SEAL
(NOMINAL PRESSURE UP TO 200 KG/SQ. CM)

3.1 Homogeneous Synthetic Rubber (Nitrile)

Homogeneous synthetic rubber used in the manufacture of the V-Packing shall not contain any substance liable to contaminate the working medium or cause corrosion of the metals coming in contact with the V-Packing or produce any tacking. It shall have the physical properties as given in Table 1, when tested in accordance with 5 of this standard and shall be in uniform quality.

3.2 Fabric – impregnated Synthetic Rubber

The fabric – impregnated synthetic rubber used for the manufacturing of V-Packing shall be composed of cotton fabric and synthetic tuber.

- The construction of the fabric shall be uniform, free from flaws, twists and knots.
- The structure of the synthetic rubber shall be homogeneous so that surfaces of the V-Packing become smooth without any air holes, cracks, blisters and other strange inclusions.

The Fabric-impregnated synthetic rubber shall not contain ant substance liable to contaminated petroleum based hydraulic oil or cause corrosion of metal in contact with V-Packing or produce tacking. It shall have the physical properties as shown in Table 2, when tested in accordance with relevant clauses of this standard.

4. **DESIGNATIONS**

The v-Packing rings shall be designated in sets giving the particulars of plunger diameter (\$ d), cylinder bore diameter (\$ d) and assembled total height (H) along with the material of construction for the required working conditions, for example:

V-Packing, HSR-125 X 155 X 60, IPSS: 1-02-016-18

In case the number of rings required in a set is five, that too can be specified as follows:

V-Packing, HSR-125 X 155 X 60 X 5, IPSS: 1-02-016-18

- 4.1 If metallic spacer rings are to be used with fabric impregnated synthetic rubber rings, the same shall be mentioned in bracket, for example:

V-Packing, FSR-125 X 155 X 75 X 7, IPSS: 1-02-016-18

(with 2 metallic spacer rings in each set)

5. **TESTS**

The following precautions are to be taken while preparing samples for the tests:

- a. The material of the test pieces of synthetic rubber shall be produced by the same process as the material of the V-Packing and
- b. The material of the test pieces of fabric-impregnated synthetic rubber sheet shall be conform to the following :
 1. The material shall be same as that used for fabric-impregnated synthetic rubber V-Packing and
 2. The process shall be same as that used for manufacturing the V-Packing.

5.1 **Test of Tensile Strength**

For this test 3 test pieces shall be prepared from 3 different directions of the material sheet. The test method shall conform to IS: 3400 (Part 1)-1987. The pulling speed of the test pieces during testing shall be at the rate of 300 ± 15 mm/ min and the result of the tensile test

shall be the mean value of the 3 test pieces. The results shall conform to the values given in Table 1 and 2.

5.2 Bending Test

For this test, 2 test samples of 2 or 3 mm thick x 15 mm wide x 100 mm long shall be taken from each direction of the material sheet. This test for all the 4 test samples shall be carried out by bending them around on iron bar of 4 or 6 mm dia. respectively through an angle of 180 deg. After examining, no presence of fracture shall be seen. The results shall conform to the values given in Table 1 and 2.

5.3 Oil Resistance Test

- a. For testing oil resistance of the material used for the manufacturing of V-Packing, 3 test samples of 2 or 3 mm thick x 20 mm wide x 20 mm long shall be taken.
- b. The tests shall be carried on under the conditions specified in Table 1 and 2 by dipping the test samples in the oil and examining the percentage of weight increase and change in the appearance. The results shall conform to the values given in Table 1 and 2.
- c. The final results shall be obtained from the average value of results of 3 test samples.

5.4 Corrosion and Tacking Test

When tested in accordance with 5.4.1 and 5.4.2, the materials of the V-Packing shall not cause rust to the metals in contact or produce tacking. But mere discolouration of metal surfaces shall not be considered detrimental.

5.4.1 Take 4 test samples of 2 or 3 mm thickness x 25 mm width x 50 mm length made of the same materials as those of V-Packing which have been prepared under the same conditions as those used for manufacturing V-Packing.

5.4.2 The test shall be carried out by placing the 4 test pieces alternatively between well polished brass plates as per IS : 410-1977 "Specification for cold rolled brass sheet, strip and foil (third revision)" and steel plates as

per IS : 1730 – 1989“ Dimensions for steel plate, sheet and strip for structural and general engineering purpose : Part 1 Plate (Second Revision) and stainless steel plates as per IS : 6911 – 1972 “Specification for stainless steel plate, sheet and strip” of 25 mm width x 50 mm length well pressed together at 70 ± 1 deg. C for 24 hours. There shall be no corrosive and tacking effects on the surface.

5.5 Functional Test

The apparatus used for this test is shown in Fig. 2. The detailed design aspects of this apparatus can be worked out by the manufacturer of the V-Packing. After placing the V-Packing as shown in Fig. 2, test fluid shall be supplied at 1.5 times the normal working pressure. There may be leakage, only sufficient enough to keep the ram wet. The duration of the test shall be minimum 100 strokes of the test ram.

TABLE 1 : RESULTS FOR VARIOUS TESTS FOR HOMOGENEOUS SYNTHETIC RUBBER

(Clause 5.1 and 5.2)

Type of Test	Description	Requirement	Test Condition	Standard Reference
Physical	Hardness, IRHD Tensile strength, Min. MN/sq. m Minimum elongation, % Tensile stress (under 100% elongation), Min. MN/sq. m	90 + 5 10 100 7	Original state	IS : 3400 (Part 1) – 2012*
Aging	Change in IRHD Hardness, Max Change in tensile strength, Max. % Change of elongation, Max. %	+ 10 -20 -50	Temperature 100 deg. C Duration 70 h	IS : 3400 (Part 2) – 2003 *
Compression Set	Compression set, Max. %	75	Temperature 100 deg. C Duration 70 h	IS : 3400 (Part 10) – 1977 *
Oil resistance	Change in hardness, IRHD Change in UTS, Max. % Change in elongation, Max. % Volumetric change, %	-10 to +5 -35 -35 0 to 20	Temperature 100 deg. C Duration 70 h Test oil grade II of IS : 3098 – 1975 #	IS : 3400 (Part 6) – 2012*
<ul style="list-style-type: none"> Method of test for vulcanized rubbers (Part 1) – 2012 Tensile stress-strain properties (Third Revision) (Part 2) – 2003 Hardness (Third Revision) (Part 10) – 1977 Compression set at constant strain (first revision) (Part 6) – 2012 Resistance to fluid (third revision) <p># Specification for oil, hydraulic, mineral oil type (first revision)</p>				

**TABLE 2: RESULTS OF PHYSICAL AND OIL RESISTANCE TEST FOR FABRIC
IMPREGNATED SYNTHETIC RUBBER
(Clause 5.1 and 5.2)**

Type of Test	Description	Requirement	Test Condition	Standard Reference
Physical	Tensile strength, Min. MN/sq. m Bending (using 5 mm steel bar)	15 No crack should appear in long way or side way	Normal	-
Oil resistance	Change in weight % Appearance	0 to +15 Not to produce peeling or other defects	Temperature 100 deg. C Test oil grade II of IS : 3098 – 1983	IS : 3400 (Part 6) – 2012 (third revision)

6. TECHNICAL INFORMATION REQUIRED WHILE ORDERING

In addition to the full designation mentioned in 4, the following information shall be given in the indent:

- a. Operating temperature
- b. Maximum working pressure
- c. Type of fluid to be sealed
- d. Hardness and
- e. Plunger speed.

7. INSPECTION

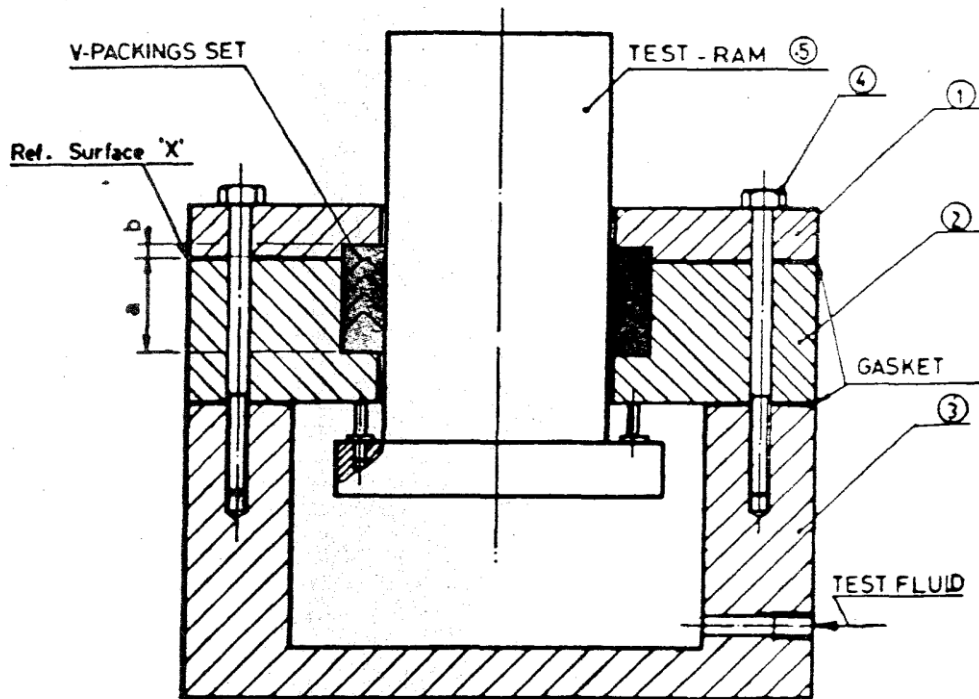
7.1 Appearance

The edge of the lip of V-Packing shall be sharp, smooth and uniform for perfect sealing. It shall be free from any cut, crack or apparently harmful defects. In the case of fibre impregnated rubber, it shall not have loose threads at the edges.

7.2 Materials

The supplier of the V-Packing shall provide a certificate that the materials of the V-Packing are capable of passing through all those tests detailed

under clause 5. On demand, the manufacturer shall conduct these tests on random samples in the presence of the buyer's representative.



Assembled total height of V Packing = $a + b$
FIG. 2 V-PACKING ASSEMBLY IN POSITION

Assembled total height of V-Packing = $a + b$

FIG. 2 : V-PACKING ASSEMBLY IN POSITION

7.3 Measurements of Dimensions

Dimensional measurement shall be done by assembling the V-Packing with part no. 2 and 5 of the Fig. 2 separately. The depth (a) and (b) (measured with respect to the surface X with the help of a dial indicator) shall give the height of the set of V-Packing.

8. MARKINGS

All parts of the set of V-Packing shall have embodied on their inner side of the lips, the following information in such a manner that the embossing shall not interfere with the efficient functioning of the packing:

- a) The manufacturer's name or trade-mark,
- b) Designation and
- d) Month and year of manufacture

- 8.1. **The outer wrapping of the packing sets shall be indicated with the following information:**
- a. Designation and total assembled height of the set.
 - b. Date of manufacture and
 - c. Name of the manufacturer or trade-mark.